

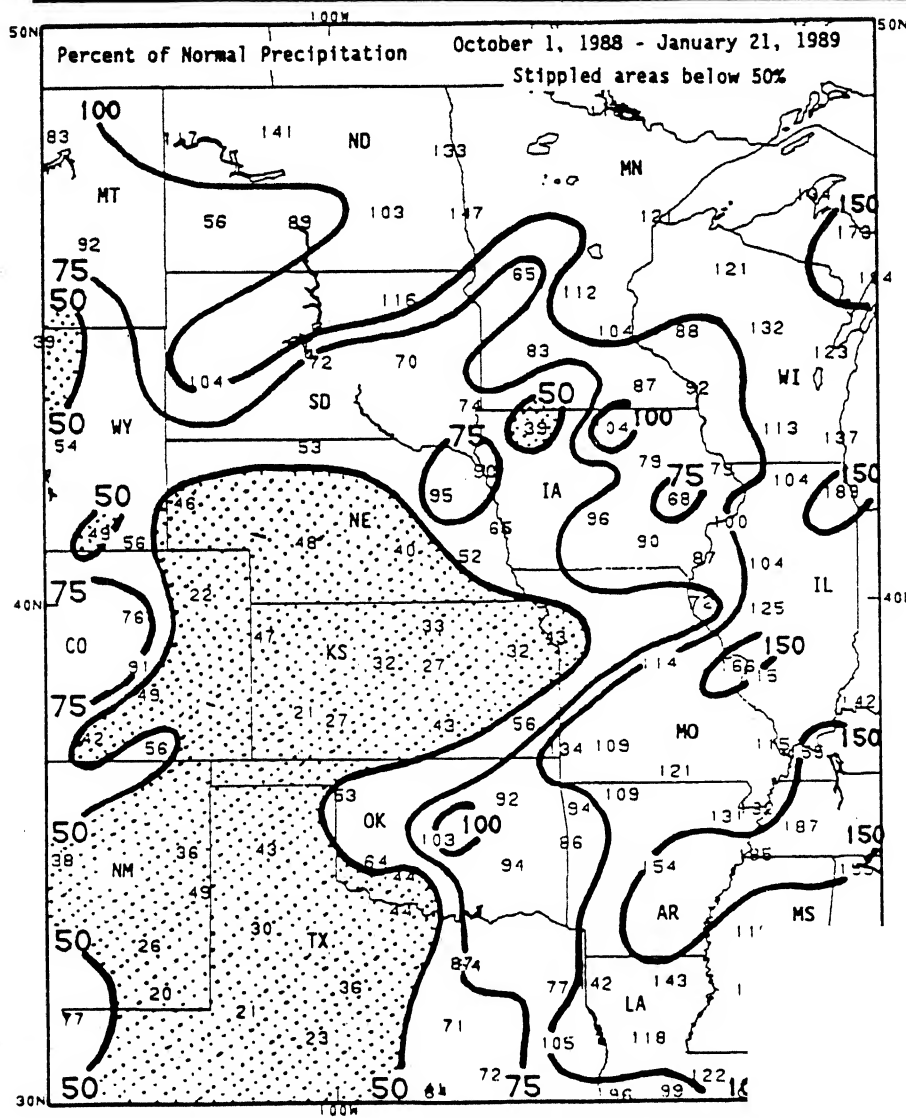
CONTAINS: 1988
GLOBAL CLIMATE
REVIEW AND
1988 WEEKLY
CLIMATE
BULLETIN INDEX

WEEKLY CLIMATE BULLETIN

No. 89/03

Washington, DC

January 21, 1989



DURING THE PAST THREE AND ONE-HALF MONTHS, MUCH OF THE CENTRAL AND SOUTHERN GREAT PLAINS HAVE EXPERIENCED EXTREMELY DRY WEATHER. SINCE OCTOBER 1, 1988, ONLY 1 TO 2 INCHES OF PRECIPITATION HAS FALLEN ON THE REGION AS DEFICITS HAVE ACCUMULATED UP TO 4.4 INCHES IN EASTERN KANSAS. THE 1988 CLIMATE

UNITED STATES DEPAR

WEEKLY CLIMATE BULLETIN

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This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major global climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every 3 months).
- Global temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JANUARY 21, 1989

[Approximate duration of anomalies is in brackets]

1. Alaska and Northwestern Canada:

ABNORMALLY MILD WEATHER ENDS.

Temperatures plummeted to as much as 23.5°C (45.9°F) below normal as the mild regime was replaced by bitter cold [Ended at 5 weeks].

2. Southwestern United States:

COLD CONDITIONS EASE.

Temperatures moderated last week; however, some mountain valleys reported temperatures approaching 9.4°C (16.9°F) below normal [Ending at 4 weeks].

3. Uruguay and Northern Argentina:

AREA STILL DRY.

Precipitation was generally less than 13.5 mm (0.53 inches) as dryness persisted [30 weeks]. Temperatures returned to near normal across most of the region [Ended at 8 weeks].

4. Italy:

DRYNESS CONTINUES.

Little or no precipitation fell in northern and central Italy as a dry spell continued [9 weeks].

5. Greece, Turkey, and the Middle East:

TEMPERATURES MODERATE.

Milder conditions spread across most of the region; however, temperatures were as much as 4.5°C (8.1°F) below normal in some parts of Turkey [Ending at 6 weeks].

6. South Central Siberia:

MILD CONDITIONS LINGER.

The mild weather regime, with temperatures reaching 10.7°C (19.3°F) above normal, persisted in the region east of Lake Baykal [15 weeks].

7. Northwestern India:

UNUSUALLY COLD WEATHER OCCURS.

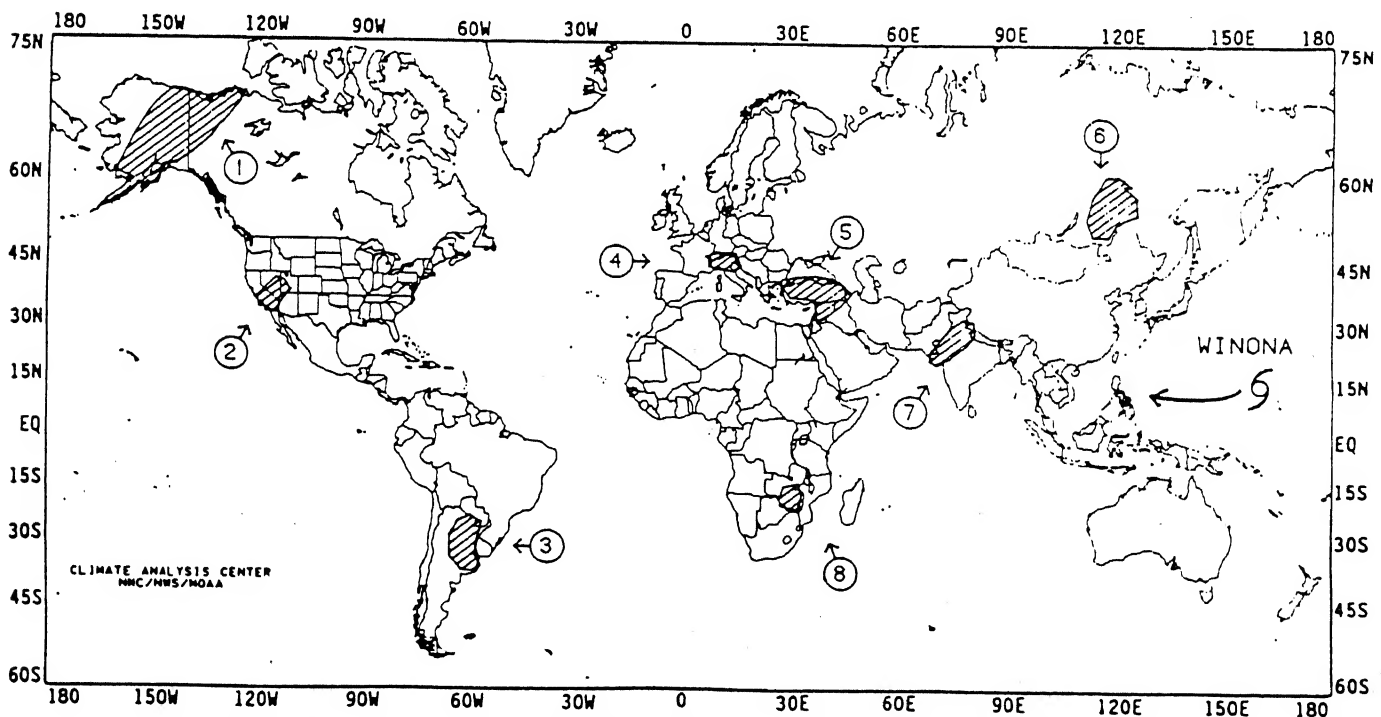
Temperatures reached 4.7°C (8.5°F) below normal as abnormally cold conditions prevailed [2 weeks].

8. Zimbabwe:

DRY SPELL DEVELOPS.

Little or no precipitation fell in Zimbabwe as very dry conditions developed [7 weeks].

(NOTE: Text precipitation amounts and temperature departures are this week's values).



Approximate locations of the major anomalies and events described above are shown on this map. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, longer term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JANUARY 15 THROUGH JANUARY 21, 1989.

Much of the nation experienced mild and dry conditions with the exception of the northwestern and southeastern corners of the contiguous United States. With the storm track remaining well north of its normal January position, wintery weather was confined to the northern tier of states and in Alaska. Early in the week, winds up to 90 mph hit Choteau, MT, with lesser gusts reported in the northern High Plains region. Subzero temperatures and strong winds produced dangerous wind chills (below -45°F) in parts of northern New England.

According to the River Forecast Centers, between 1 and 3 inches of precipitation was measured along the Pacific Northwest Coast, with up to 6 inches at Quillayute, WA. Heavy snows fell further inland on sections of the Cascades and the Rockies in northern Idaho and western Montana. Farther east, a stationary front produced heavy rains (up to 5.2 inches) in southern Louisiana and southeastern Texas and provided some relief from unusually dry conditions in the latter region (see Table 1). Similar to southeastern Texas, central and southern Florida, relatively dry during the past seven weeks, received moderate to heavy rains (6.2 inches near Cape Canaveral, FL) in association with a developing low pressure center in the eastern Gulf of Mexico. In Alaska, moderate to heavy precipitation was limited to stations along the extreme southeastern coast, while torrential rains deluged Hilo, HI with more than 7.5 inches. Light to moderate amounts were reported in most of the Pacific Northwest, the northern Rockies, the extreme northern and southern Great Plains, the northern and eastern

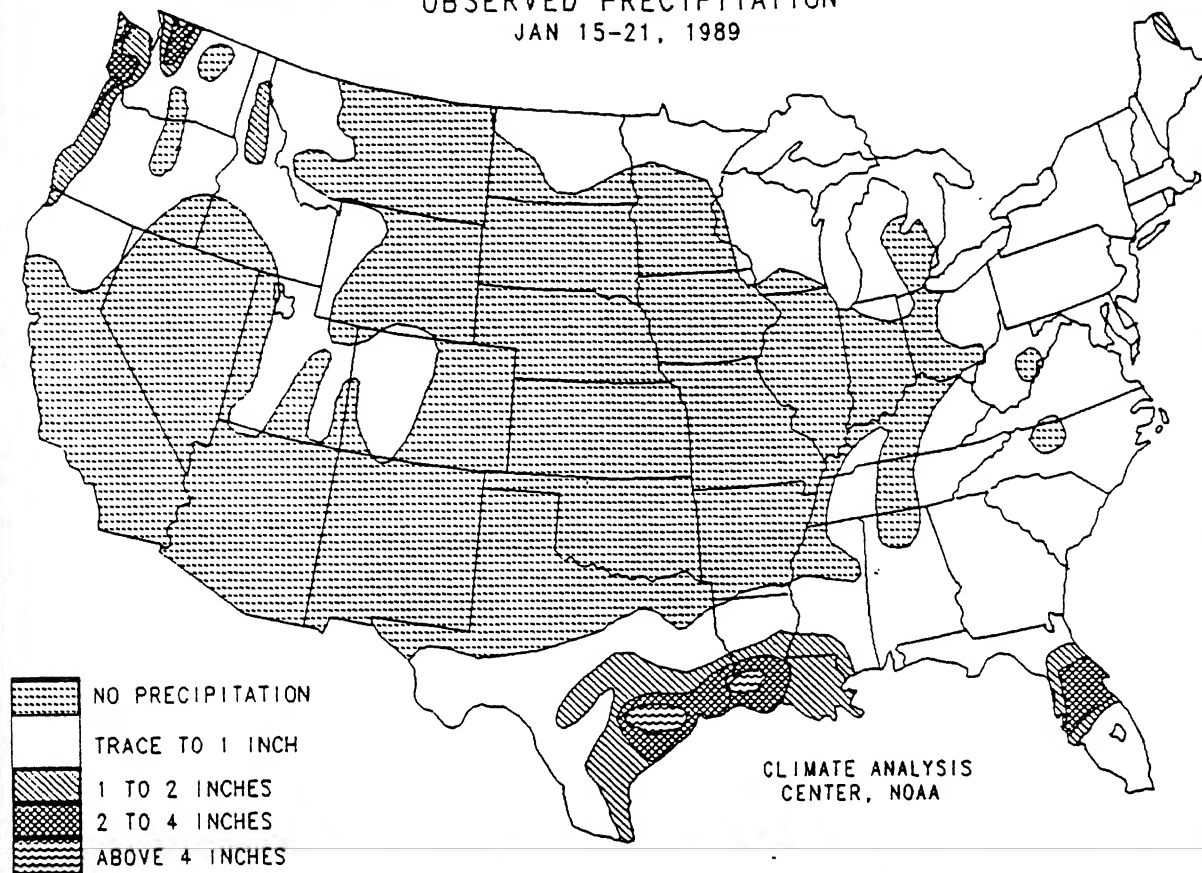
Great Lakes, in much of New England, and along the Gulf and Atlantic Coasts. Little or no precipitation was observed in the southern halves of the Pacific Coast and Intermountain West, in most of the Rockies, the central Great Plains, the Missouri, middle and lower Mississippi, Tennessee, and Ohio Valleys, and sections of the Appalachians.

Normally, mid to late January is the coldest time of the year, but last week's temperatures were up to 22°F above normal as unseasonably mild weather prevailed across much of the lower 48 states. The greatest positive departures (between $+15^{\circ}$ and $+22^{\circ}\text{F}$) were found from central Montana southeastward to central Iowa (see Table 2). A blast of cold Arctic air towards the end of the week helped to moderate weekly departures in the eastern half of the country, but temperatures still averaged between 4° and 10°F above normal. Before the frontal passage, readings in the sixties were recorded as far north as Maryland, Missouri, and South Dakota (see Figure 1). In sharp contrast, bitterly cold weather invaded most of Alaska as lows plummeted below -40°F (-60°F at Bettles and Nenana, AK) and temperatures averaged as much as 42°F below normal (see Table 3). Fairbanks recorded a high of -41°F on Jan. 18, while Anchorage's Jan. 19 low of -24°F was its coldest reading since 1975. Farther south, subnormal temperatures persisted in the Great Basin and central Rockies as snow cover, clear skies, and low winds dropped readings below zero. Temperatures in southwestern Texas and along the western half of the Gulf Coast were slightly below normal.

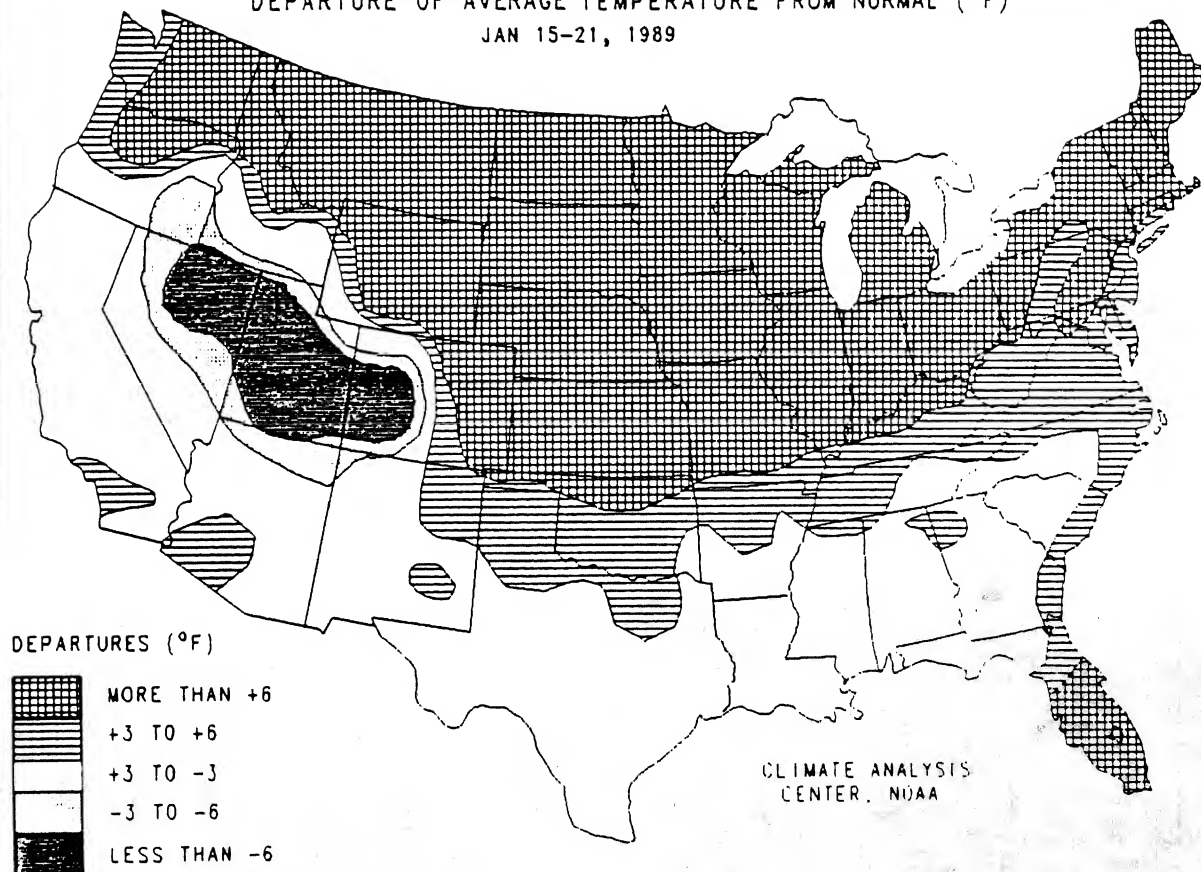
TABLE 1. Selected stations with more than two inches of precipitation for the week.

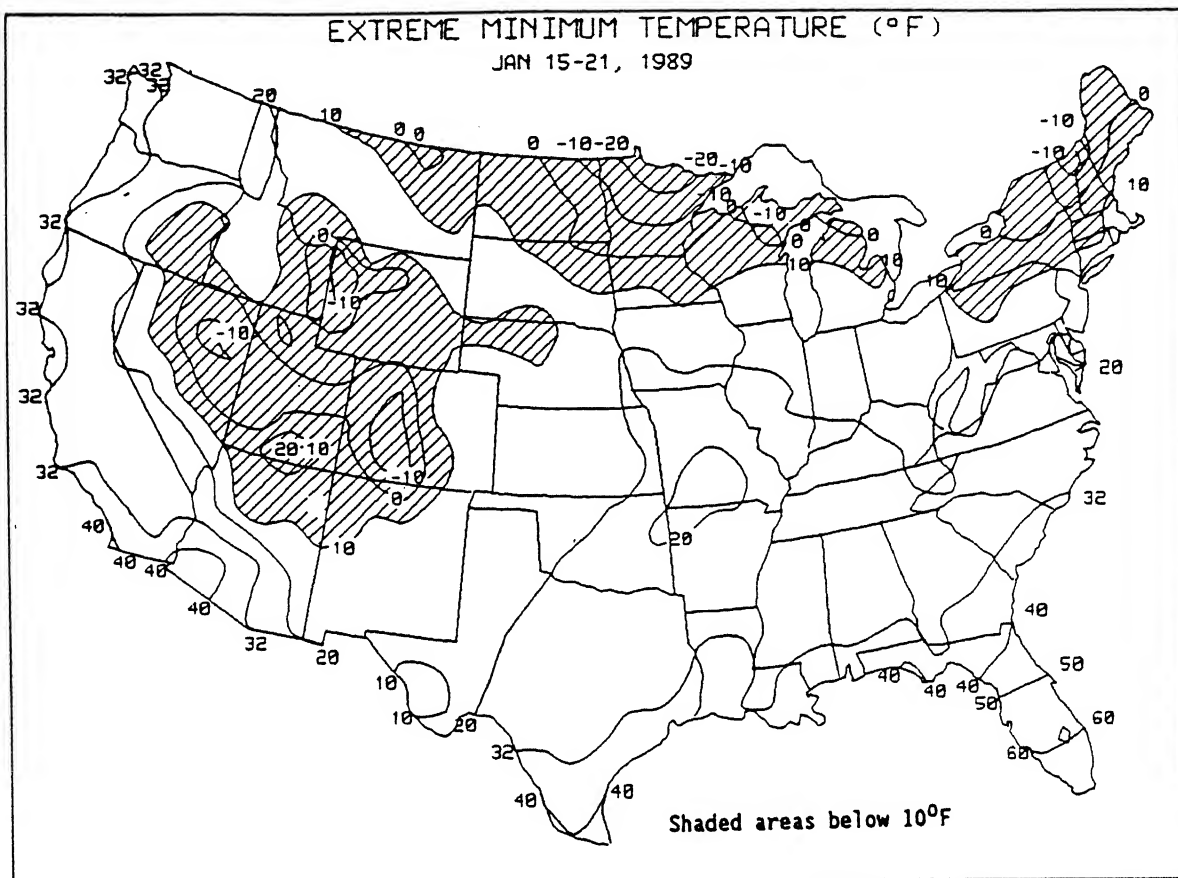
| Station | Amount(In) | Station | Amount(In) |
|---------------------------|------------|---------------------|------------|
| Hilo/Lyman, Hawaii, HI | 7.60 | Galveston, TX | 2.83 |
| Quillayute, WA | 6.14 | Port Arthur, TX | 2.72 |
| Houston/Ellington AFB, TX | 4.32 | Lafayette, LA | 2.43 |
| Houston/William Hobby, TX | 3.77 | Astoria, OR | 2.36 |
| Annette Island, AK | 3.63 | New Orleans NAS, LA | 2.29 |
| Cape Canaveral AFS, FL | 3.11 | Victoria, TX | 2.22 |
| Mt. Washington, NH | 3.07 | Orlando, FL | 2.09 |
| Lake Charles, LA | 2.92 | Ketchikan, AK | 2.07 |
| Palacios, TX | 2.87 | Adak, AK | 2.04 |

OBSERVED PRECIPITATION JAN 15-21, 1989

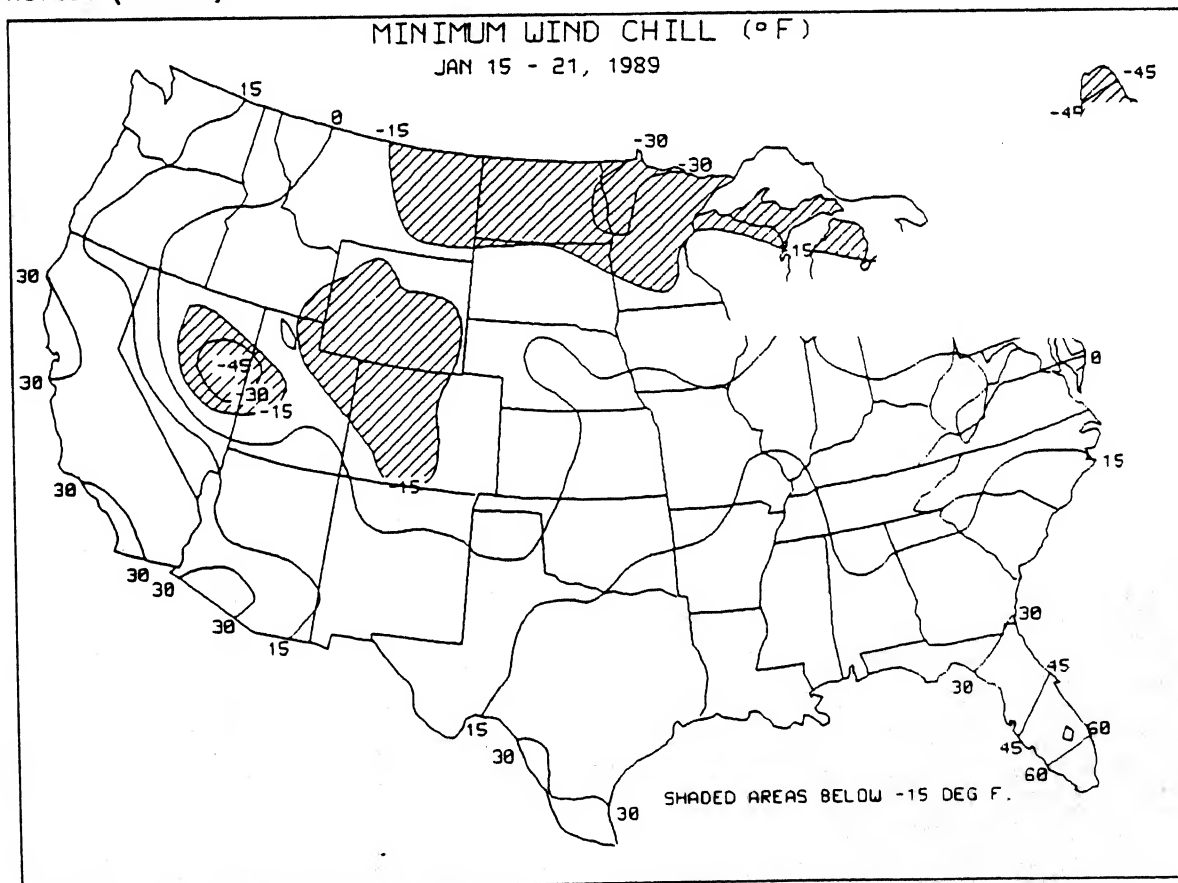


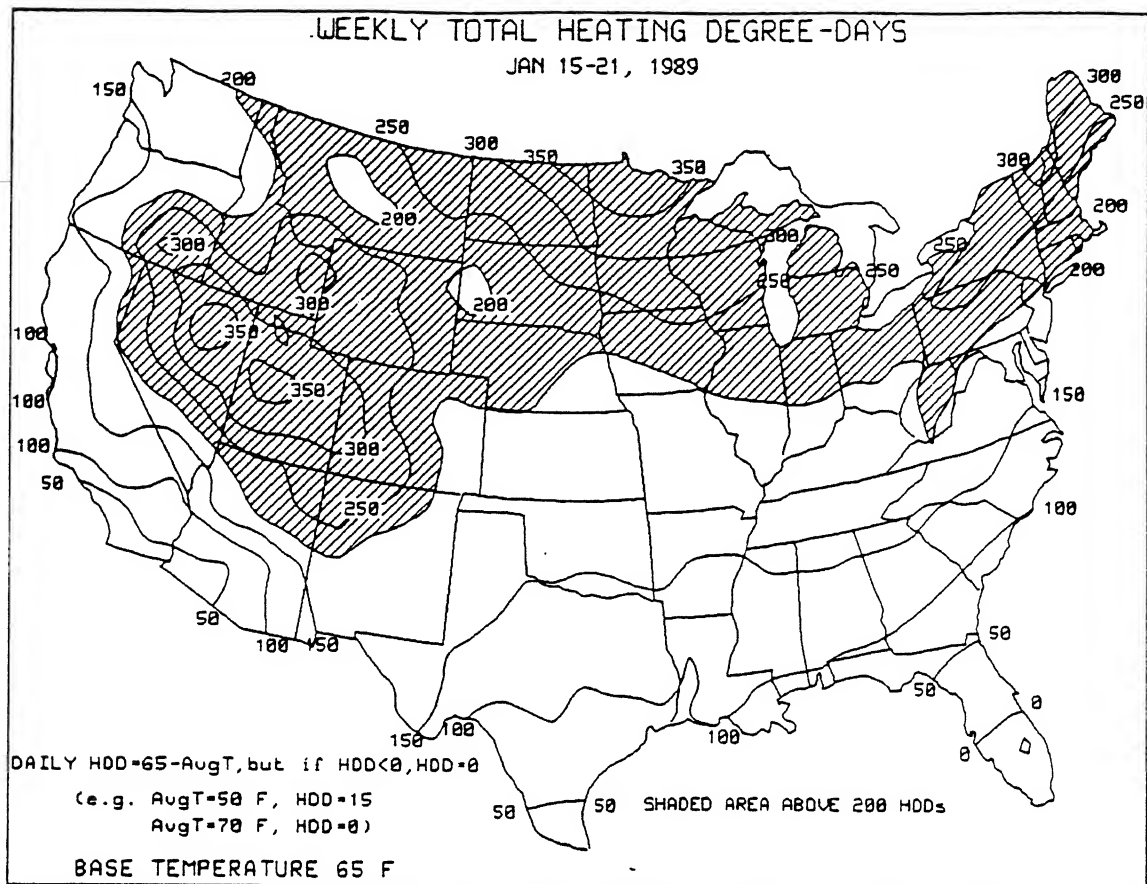
DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F) JAN 15-21, 1989



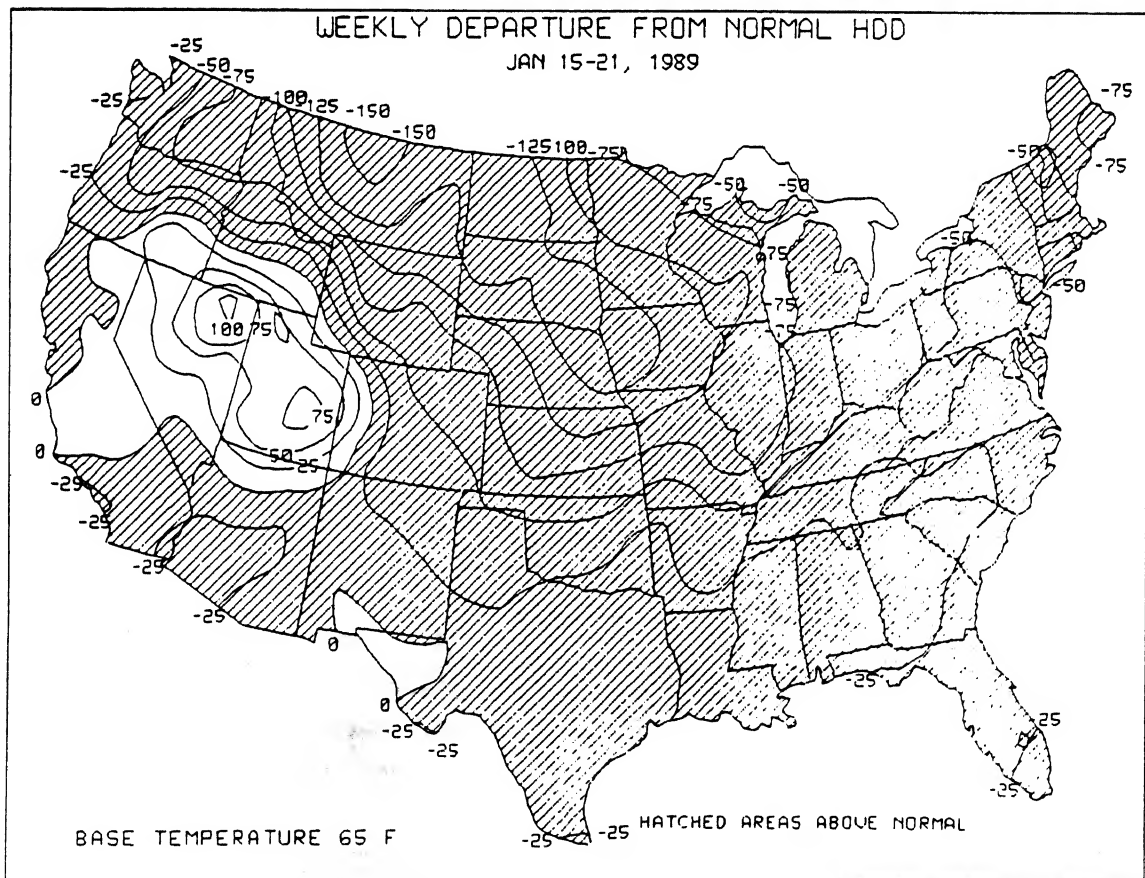


Mild weather kept subzero readings limited to portions of the Rockies, the upper Midwest, and northern New England (top). After two consecutive weeks with wind chills less than -60°F, much above normal temperatures kept wind chills greater than -30°F with the exception of northern New England and parts of Minnesota and Nevada (bottom).



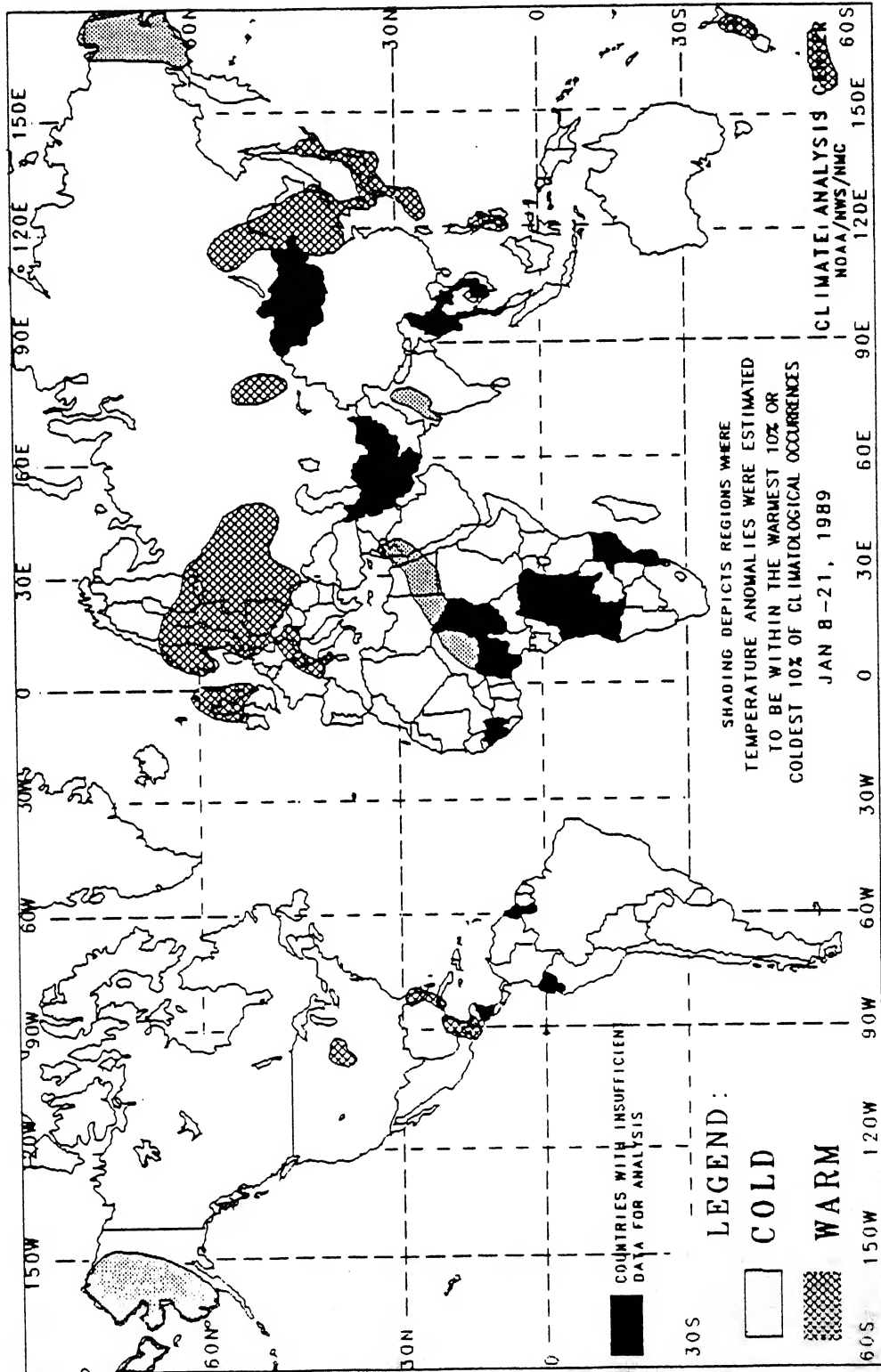


Weekly heating usage was much less than previous weeks in the northern tier of states as abnormally mild conditions kept total HDD's under 350 except for northern Minnesota and parts of the Rockies (top). With above normal temperatures across a vast majority of the lower 48 states, weekly heating demand was much less than normal, especially in the northern Rockies and Great Plains where demand was only 50-75% of normal (bottom).



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

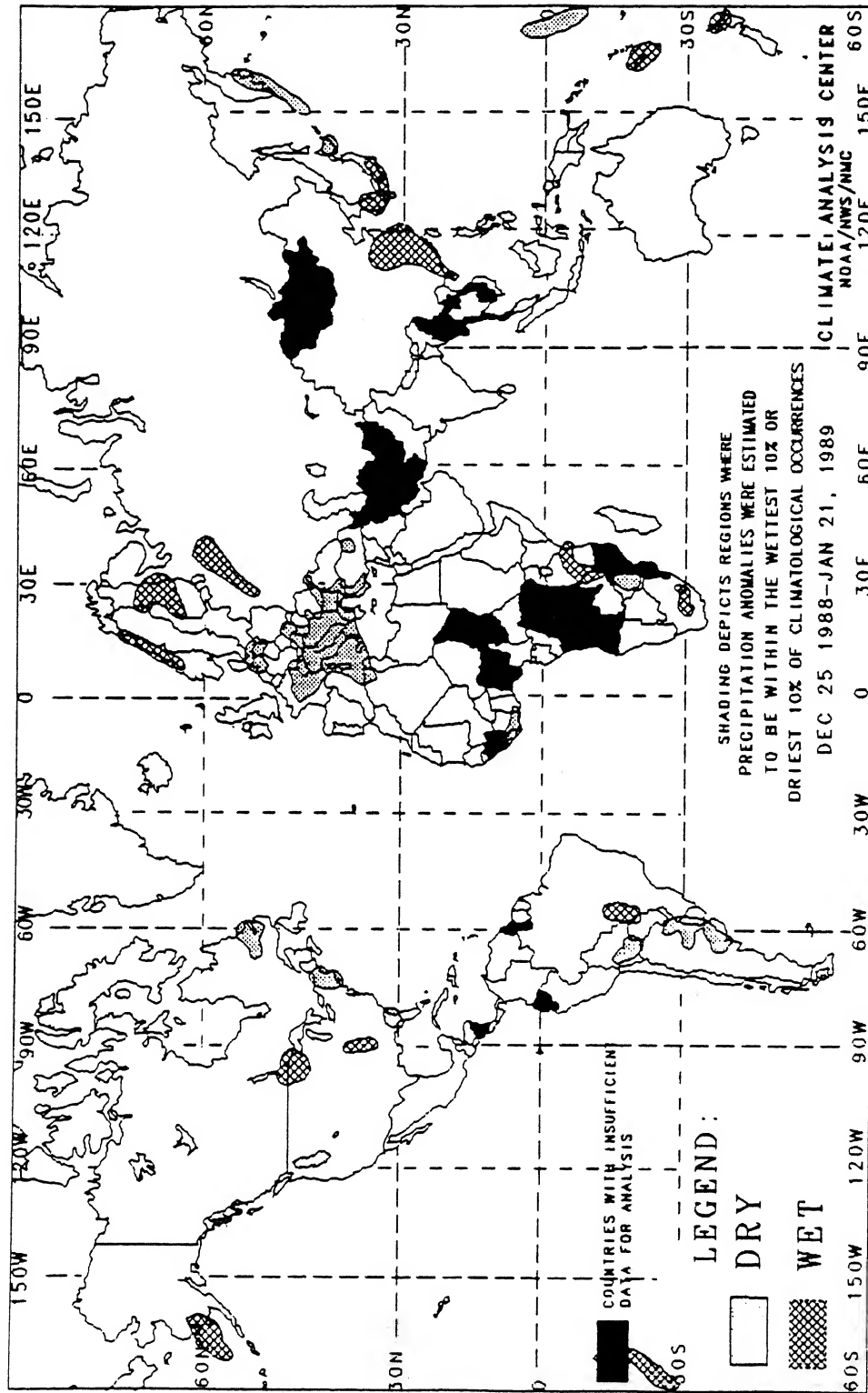
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

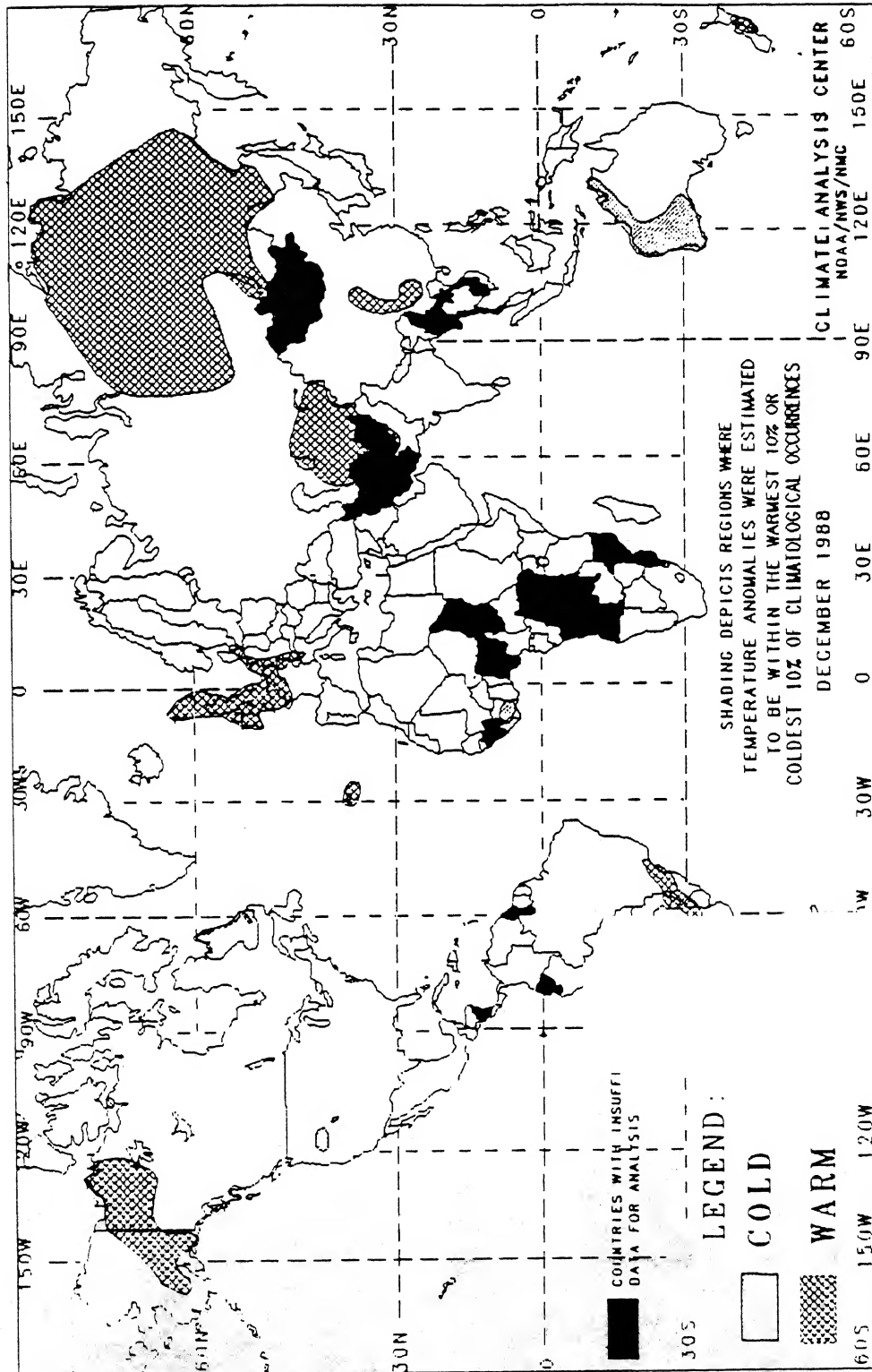
In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL TEMPERATURE ANOMALIES

1 MONTH



In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

By 2500 observing stations were received twenty-four hour result of these have a warm bias. tent of some warm

e magnitude of

The anomalies on this chart are based on stations for which at least 26 days of data were received from synoptic reports. Many stations do not have data on a basis so many night time observations are missing observations the estimated minimum. This in turn may have resulted in an overestimation of anomalies.

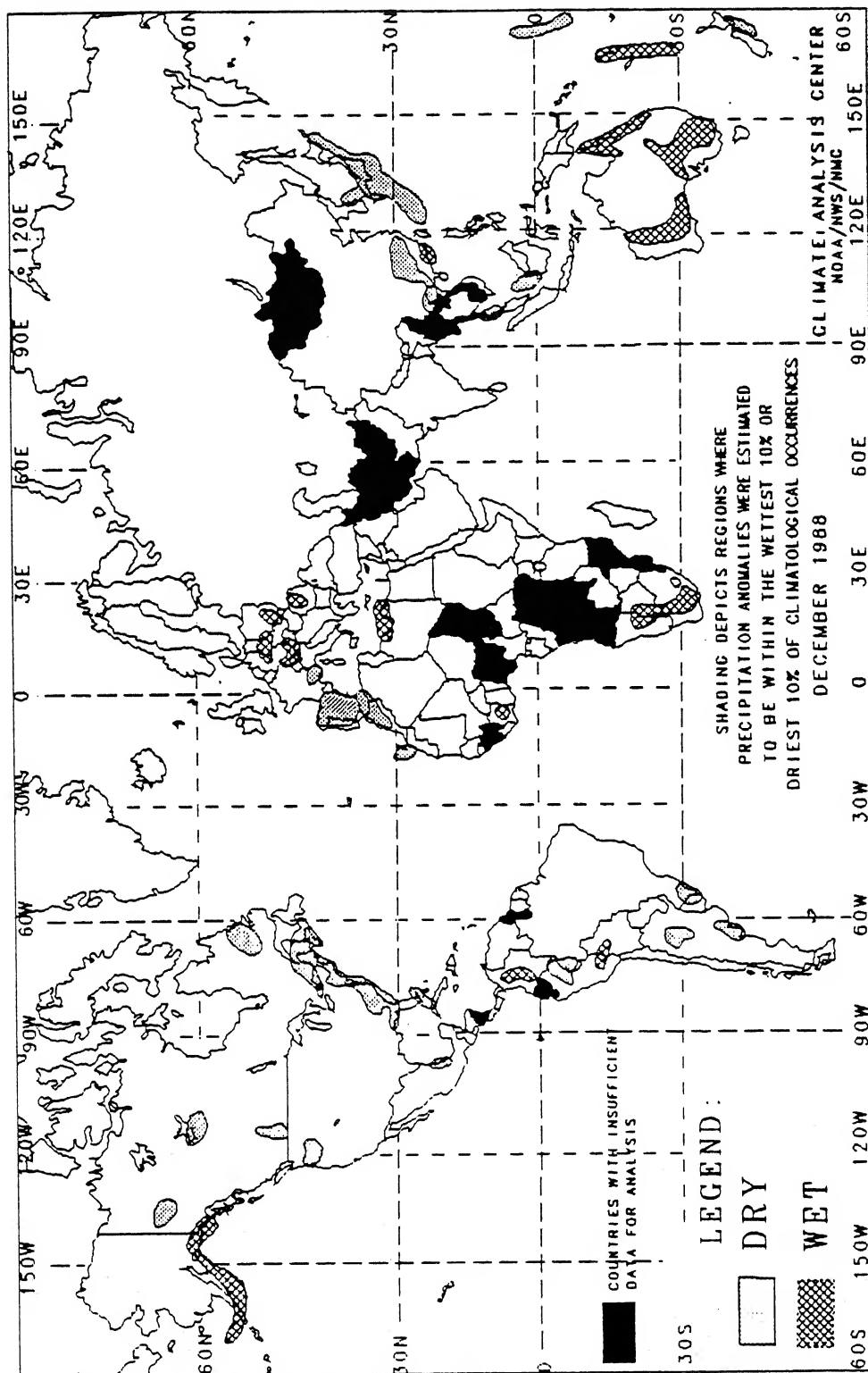
Temperature anomalies are not temperature departures from normal exceed

PRINCIPAL TEMPERATURE ANOMALIES - DECEMBER 1988

| REGIONS AFFECTED | TEMPERATURE AVERAGE (C) | DEPARTURE F/NORMAL (C) | COMMENTS |
|--|----------------------------|---------------------------|--------------------------------------|
| Alaska and adjacent Canada | -23 to -2 | +3 to +9 | WARM - 4 to 22 weeks |
| Southeastern Oregon and Southwestern Idaho | -5 to -3 | Around -3 | Very cold second half of December |
| Southeastern Quebec and Northern Newfoundland | -24 to -18 | -3 to -5 | COLD - 9 weeks |
| Argentina and extreme Southern Brazil | +22 to +30 | +2 to +4 | WARM - 2 to 10 weeks |
| The Azores | Around +17 | Around +2 | Very warm first half of December |
| Western Europe | +3 to +10 | +2 to +4 | MILD - 2 to 9 weeks |
| Ivory Coast | +21 to +25 | -2 to -3 | Very cool second half of December |
| Pakistan and South Central Soviet Union | -8 to +14 | +3 to +6 | MILD - 4 to 10 weeks |
| Siberia | -40 to -11 | +2 to +12 | MILD - 4 to 22 weeks |
| Central China | -4 to +18 | +2 to +3 | MILD - 2 to 10 weeks |
| Western Australia | +16 to +29 | -2 to -3 | COOL - 2 to 10 weeks |
| Central New Zealand | +17 to +18 | Around +2 | Very warm second half of December |

GLOBAL PRECIPITATION ANOMALIES

1 MONTH



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the one month period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total one month precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

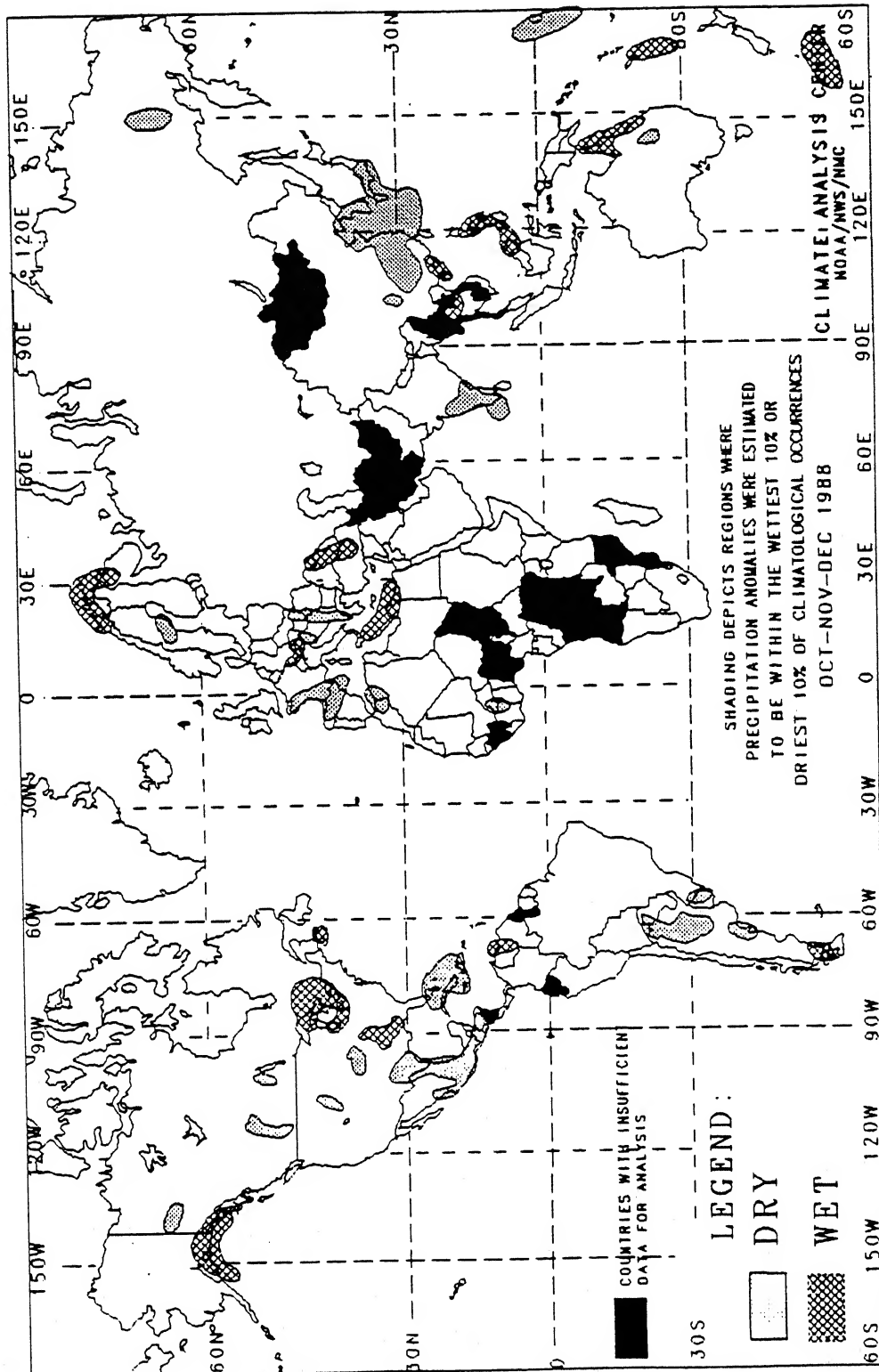
PRINCIPAL PRECIPITATION ANOMALIES - DECEMBER 1988

| REGIONS AFFECTED | PRECIPITATION TOTAL (MM) | PERCENT OF NORMAL | COMMENTS |
|--|-----------------------------|----------------------|---|
| Southern Alaska | 40 to 621 | 129 to 283 | WET - 2 to 7 weeks |
| West Central Yukon | 0 to 5 | 0 to 20 | DRY - 12 to 15 weeks |
| North Central Canada | 5 to 7 | 22 to 27 | DRY - 8 to 9 weeks |
| Southwestern Alberta | 0 to 26 | 0 to 49 | DRY - 14 to 22 weeks |
| East Central Quebec | 16 to 31 | 31 to 41 | DRY - 5 weeks |
| Northern Oregon | 9 to 82 | 22 to 37 | DRY - 6 to 7 weeks |
| Southeastern Canada and Eastern United States | 0 to 75 | 0 to 77 | DRY - 4 to 9 weeks |
| Southern Florida | 3 to 5 | 7 to 11 | DRY - 10 weeks |
| East Central Mexico | 2 to 33 | 7 to 73 | DRY - 4 weeks |
| West Central Colombia | 118 to 293 | 188 to 288 | Heavy precipitation early and late December |
| Northeastern Peru and adjacent Brazil | 33 to 113 | 12 to 53 | DRY - 9 weeks |
| Southeastern Peru and adjacent Bolivia | 220 to 479 | 182 to 218 | WET - 2 to 4 weeks |
| Northern Argentina | 3 to 57 | 6 to 41 | DRY - 6 to 29 weeks |
| East Central Argentina | 0 to 28 | 0 to 39 | DRY - 10 to 29 weeks |
| Northern Uruguay and adjacent Brazil | 14 to 69 | 16 to 56 | DRY - 7 weeks |
| East Germany | 84 to 144 | 169 to 333 | WET - 6 weeks |
| South Central Poland | 58 to 90 | 156 to 242 | Heavy precipitation first half of December |
| North Central Romania | 45 to 90 | 131 to 192 | Heavy precipitation first half of December |

| REGIONS AFFECTED | PRECIPITATION TOTAL (MM) | PERCENT OF NORMAL | COMMENTS |
|---|-----------------------------|----------------------|---|
| Switzerland, Austria, and West Germany | 55 to 478 | 190 to 284 | Heavy precipitation first half of December |
| Southeastern France | 7 to 65 | 9 to 72 | DRY - 10 to 14 weeks |
| Spain, Portugal, and Morocco | 0 to 115 | 0 to 55 | DRY - 5 to 10 weeks |
| Canary Islands | 1 to 28 | 3 to 25 | DRY - 10 weeks |
| Northern Libya | 110 to 221 | 208 to 280 | WET - 2 to 5 weeks |
| Ivory Coast | 66 to 68 | 296 to 420 | Heavy precipitation first half of December |
| Botswana, Namibia, and South Africa | 43 to 148 | 181 to 630 | WET - 2 to 6 weeks |
| Interior of Southeastern China | 0 to 33 | 0 to 67 | DRY - 6 to 10 weeks |
| Coast of Southeastern China | 63 to 107 | 133 to 417 | Heavy precipitation second half of December |
| Japan and Korea | 0 to 263 | 0 to 80 | DRY - 4 to 21 weeks |
| Extreme Southern Thailand | 8 to 150 | 5 to 34 | DRY - 5 weeks |
| Western Borneo | 106 to 122 | 34 to 35 | DRY - 6 weeks |
| Western Australia | 52 to 119 | 127 to 958 | WET - 2 to 10 weeks |
| Southeastern Australia | 58 to 222 | 215 to 817 | WET - 5 to 10 weeks |
| Northeastern Australia | 270 to 575 | 156 to 291 | WET - 4 to 14 weeks |
| Kiribati Islands | 22 to 107 | 11 to 28 | DRY - 6 to 13 weeks |
| New Caledonia | 207 to 954 | 121 to 331 | WET - 4 to 8 weeks |
| Central New Zealand | 11 to 35 | 22 to 39 | DRY - 5 to 10 weeks |

GLOBAL PRECIPITATION ANOMALIES

3 MONTHS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

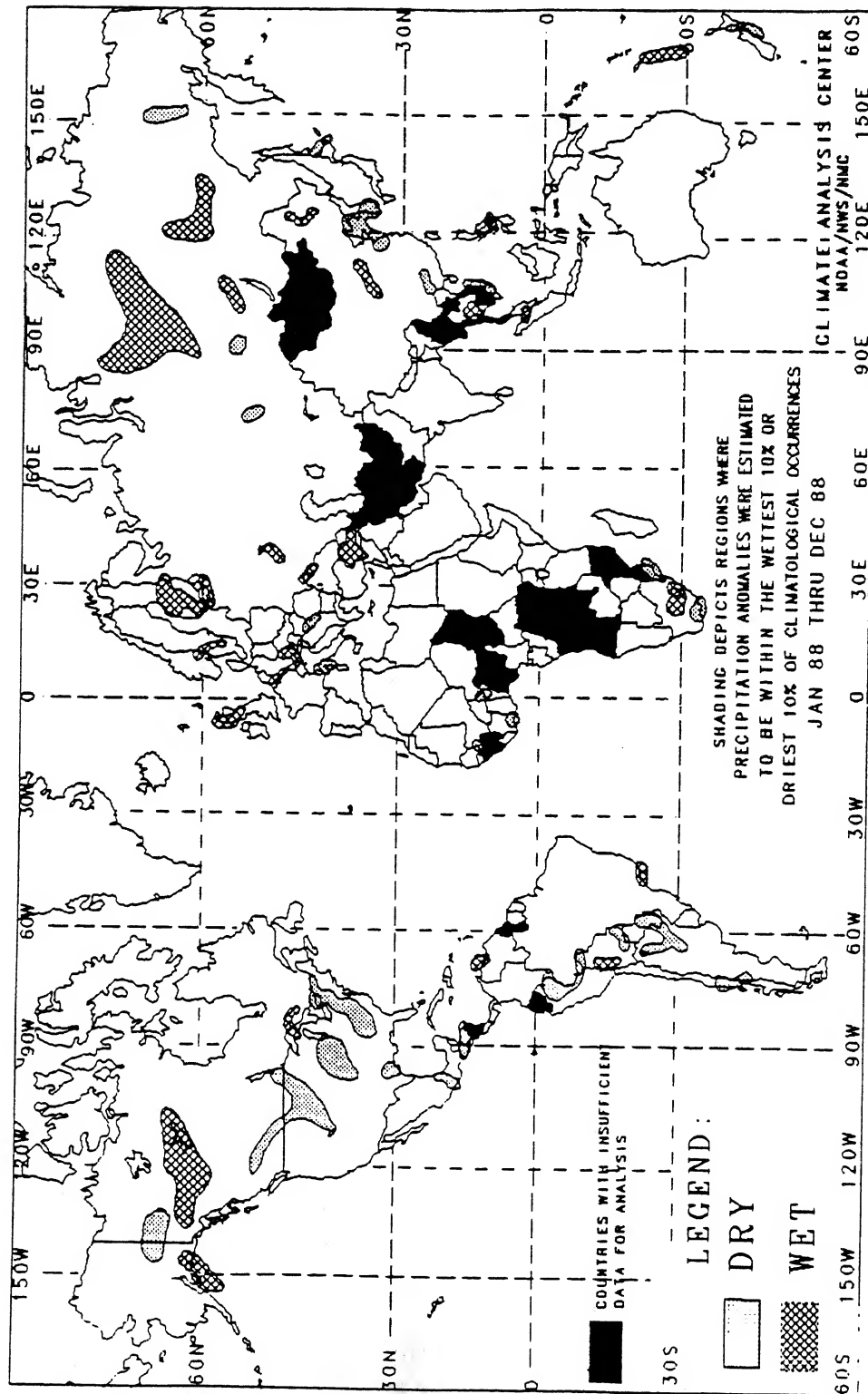
In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

12 MONTHS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 350 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the twelve month period is less than 100 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total twelve month precipitation exceeds 250 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of twelve month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER, NMC
NATIONAL WEATHER SERVICE, NOAA

MAJOR CLIMATIC EVENTS AND ANOMALIES AROUND THE WORLD IN 1988

1. United States:

DROUGHT MOST SEVERE SINCE 1936.

Major crop areas, covering over one-fourth of the lower 48 states, received less than one-half of their expected rainfall during the planting and growing periods from April through June. The driest and/or hottest periods in over 90 years were recorded in parts of the Rockies, the Great Plains, the Midwest, and the lower Mississippi Valley. The severity of the drought peaked in early July. Widespread rains during late July and August improved the short-term moisture conditions; however, several months of excess precipitation will be required to return riverflow and reservoir conditions back to normal [see Figure 1].

2. China and Taiwan:

HIGHLY VARIABLE PRECIPITATION PATTERNS DOMINATE.

Unusually dry conditions prevailed across east central China during April. In May, thunderstorms and heavy rains ended the dryness. By June dry conditions returned and spread across south central, southeastern, and east central China. Locally heavy rains began in early July; however, hot and dry weather continued in the eastern part of China. A highly variable precipitation pattern, characterized by widely scattered heavy showers, spread across most of China by late July. At the end of August, unusually wet conditions developed in southern China, then spread across central and eastern China during September and then into Taiwan by the end of the month. During the final three months of 1988, very meager rainfall (less than 50 mm) fell at stations in southeastern China. These amounts were quite low, generally less than one-half of normal, even for the normally dry autumn and early winter months (October-December). Late December heavy rains eased the dryness on the southeast coast; however, the interior remained abnormally dry [see Figure 1].

3. Equatorial Pacific:

EL NINO ENDS; HIGH INDEX PHASE TAKES OVER.

The "El Nino" pattern of anomalously warm sea surface temperatures disappeared and has since been replaced by below normal sea surface temperatures accompanied by strong easterly wind flow at the surface and strong westerly upper air (200 mb) circulation [see Figure 3].

4. South America:

DRY SINCE JUNE.

Since July (April in some areas), precipitation has been deficient in much of South America. The dry spell began in Brazil, Bolivia, and Paraguay where the normally wet spring (September to November) season had a lack of rainfall. Isolated heavy showers in late October failed to bring relief. During November and early December abnormally dry weather was limited to northern Argentina; however, dryness returned by the middle of December. Heavy rains relieved the dryness across the area except for Paraguay and parts of northern Argentina [see Figure 1].

5. United States and Canada:

REGION ENDURES HOT SPELL.

Near record-breaking high temperatures covered the northern and central portions of the United States during the summer (June-August) and much of the rest of the United States and adjacent parts of Canada experienced above normal temperatures. The warm conditions combined with a lack of rainfall to aggravate the drought. Relief, in the form of cool Canadian air, came to the region during late August after four to five months of abnormally hot weather [see Figure 3].

6. South America:

TWO COLD WAVES CHILL CONTINENT.

An extensive cold spell plagued most of the southern two-thirds of South America from the middle of May until the end of June, when low temperatures were limited to west central Bolivia. After a brief respite of near normal temperatures, cold conditions returned with freezing temperatures penetrating well north into the coffee-growing regions of Brazil. By early August the very cold conditions were limited to Bolivia and by the end of August temperatures had returned to normal [see Figure 4].

7. South Central Asia:

KAZAKH HOT AND DRY; INDIAN MONSOON BOUNTIFUL.

Very hot weather dominated south central Asia with a severe heat wave in May and June. Once the onset of the monsoon occurred, high temperatures were limited to the Kazakh and the neighboring Soviet Socialist Republics. India started out with unusually hot, dry weather, but as the monsoon rains advanced, the temperatures fell and the dryness ended. By the end of July plentiful monsoon rains covered most of northern India. Unfortunately, the anomalously heavy rains triggered flooding and mudslides. Conditions returned to near normal in the middle of August [see Figure 2].

8. Europe:

WET WEATHER FROM FEBRUARY TO APRIL.

Heavy precipitation fell across many parts of Europe from southern Scandinavia to Switzerland and Austria during late February and March. A short dry spell provided relief in early April but heavy rains returned by the middle of the month. The abnormally wet conditions ended by the first week of May [see Figure 2].

9. Scotland:

WET CONDITIONS PREVAIL.

Heavy rains at frequent intervals kept Scotland unusually wet from June through the middle of September. Short periods of dry weather provided some relief from the wet weather pattern [see Figure 2].

10. Eastern Asia:

MILD OCTOBER THROUGH DECEMBER.

Unusually mild weather was observed in southeastern Siberia, northeastern China, and Korea during October and November. In late November and early December the mild conditions were limited to southeastern Siberia. By the middle of December temperatures were well above normal across eastern Siberia, and mild weather spread westward late in the month [see Figure 3].

11. Western United States and Adjacent Canada:

YEAR OFF TO A VERY DRY START.

The Far West normally receives most of its annual precipitation during the winter months (December-February) with lesser amounts occurring in the transitional months of fall (October and November) and spring (March and April). The area had only about one-half of its expected rainfall during January and February. Precipitation remained relatively light in March but by April dryness was limited to California. Heavy rains in California during late April ended the dryness there; however, the entire region entered the dry summer season with significant precipitation deficits for the rainy season [see Figure 1].

12. Botswana, South Africa, and Zimbabwe:

TORRENTIAL RAINS OCCUR.

Very heavy precipitation fell in Botswana and Zimbabwe during February and spread into South Africa during March. Heavy showers and thunderstorms persisted until the beginning of April when drier conditions returned [see Figure 2].

13. Europe and North Africa:

VERY MILD CONDITIONS IN JANUARY AND FEBRUARY.

The first two months of 1988 were very mild across most of Europe. In early January the warmest conditions were centered over the United Kingdom and central Europe. All of Europe had above normal temperatures in January and the very warm weather spread southward to northern Africa. By the middle of February the relatively mild conditions shifted eastward but diminished by the end of the month [see Figure 3].

.. - - -

5. United States and Canada:

REGION ENDURES HOT SPELL.

Near record-breaking high temperatures covered the northern and central portions of the United States during the summer (June-August) and much of the rest of the United States and adjacent parts of Canada experienced above normal temperatures. The warm conditions combined with a lack of rainfall to aggravate the drought. Relief, in the form of cool Canadian air, came to the region during late August after four to five months of abnormally hot weather [see Figure 3].

6. South America:

TWO COLD WAVES CHILL CONTINENT.

An extensive cold spell plagued most of the southern two-thirds of South America from the middle of May until the end of June, when low temperatures were limited to west central Bolivia. After a brief respite of near normal temperatures, cold conditions returned with freezing temperatures penetrating well north into the coffee-growing regions of Brazil. By early August the very cold conditions were limited to Bolivia and by the end of August temperatures had returned to normal [see Figure 4].

7. South Central Asia:

KAZAKH HOT AND DRY; INDIAN MONSOON BOUNTIFUL.

Very hot weather dominated south central Asia with a severe heat wave in May and June. Once the onset of the monsoon occurred, high temperatures were limited to the Kazakh and the neighboring Soviet Socialist Republics. India started out with unusually hot, dry weather, but as the monsoon rains advanced, the temperatures fell and the dryness ended. By the end of July plentiful monsoon rains covered most of northern India. Unfortunately, the anomalously heavy rains triggered flooding and mudslides. Conditions returned to near normal in the middle of August [see Figure 2].

8. Europe:

WET WEATHER FROM FEBRUARY TO APRIL.

Heavy precipitation fell across many parts of Europe from southern Scandinavia to Switzerland and Austria during late February and March. A short dry spell provided relief in early April but heavy rains returned by the middle of the month. The abnormally wet conditions ended by the first week of May [see Figure 2].

9. Scotland:

WET CONDITIONS PREVAIL.

Heavy rains at frequent intervals kept Scotland unusually wet from June through the middle of September. Short periods of dry weather provided some relief from the wet weather pattern [see Figure 2].

10. Eastern Asia:

MILD OCTOBER THROUGH DECEMBER.

Unusually mild weather was observed in southeastern Siberia, northeastern China, and Korea during October and November. In late November and early December the mild conditions were limited to southeastern Siberia. By the middle of December temperatures were well above normal across eastern Siberia, and mild weather spread westward late in the month [see Figure 3].

11. Western United States and Adjacent Canada:

YEAR OFF TO A VERY DRY START.

The Far West normally receives most of its annual precipitation during the winter months (December-February) with lesser amounts occurring in the transitional months of fall (October and November) and spring (March and April). The area had only about one-half of its expected rainfall during January and February. Precipitation remained relatively light in March but by April dryness was limited to California. Heavy rains in California during late April ended the dryness there; however, the entire region entered the dry summer season with significant precipitation deficits for the rainy season [see Figure 1].

12. Botswana, South Africa, and Zimbabwe:

TORRENTIAL RAINS OCCUR.

Very heavy precipitation fell in Botswana and Zimbabwe during February and spread into South Africa during March. Heavy showers and thunderstorms persisted until the beginning of April when drier conditions returned [see Figure 2].

13. Europe and North Africa:

VERY MILD CONDITIONS IN JANUARY AND FEBRUARY.

The first two months of 1988 were very mild across most of Europe. In early January the warmest conditions were centered over the United Kingdom and central Europe. All of Europe had above normal temperatures in January and the very warm weather spread southward to northern Africa. By the middle of February the relatively mild conditions shifted eastward but diminished by the end of the month [see Figure 3].

14. Eastern Europe and the Middle East:

NOVEMBER AND DECEMBER VERY COLD.

Unusually low temperatures spread across much of eastern Europe during late October and early November. By the middle of November the cold weather spread to the southeast. Winter storms, with heavy high winds, hit the Alps and West Germany in late November in early December. High winds and heavy snows struck in the Middle East late in the month. Temperatures fell in the middle of December, and by the end of the month to Finland, Greece, and the Middle East.

15. Australia:

HOT AND DRY JANUARY

The eastern two-thirds of Australia had hot and dry conditions during January and early February. In the middle of the month conditions existed but the hot and dry conditions continued to north central Australia. Temperatures fell in March and heavy rains ended the dry spell.

16. Europe and Northern Africa:

HEAT WAVES IN JULY AND AUGUST.

High temperatures dominated Europe and northern Africa in early July. Northern Africa had a brief respite from the heat in late July, but the hot weather returned in early August. Cooler conditions moved across northern Europe during the first week of August. In the middle of the month above normal temperatures were limited to southern and central Europe and the hot spell abruptly ended late in August [see Figure 3].

17. United States:

VERY DRY CONDITIONS PREVAIL.

Unusually dry conditions spread across the eastern half of the United States during February and March. By the middle of April relief came to the Northeast and the drought in the central United States (see item 1 above) had begun. Much needed rains fell across the Southeast in late April and ended the dryness there [see Figure 1].

18. Brazil:

RIO DE JANEIRO/SAO PAULO AREA AFFLICTED BY HEAVY RAINS.

Much of the coastal and mountainous regions around Rio de Janeiro experienced torrential rains during February. The distribution of rainfall was quite uneven with heavy downpours in episodes of a day or two and quiet weather in between. This pattern also affected the Sao Paulo area in March. By the end of March the regime of recurrent thunderstorms ended and drier conditions returned [see Figure 2].

19. Eastern Europe:

DRY SPELL IN MAY AND EARLY JUNE.

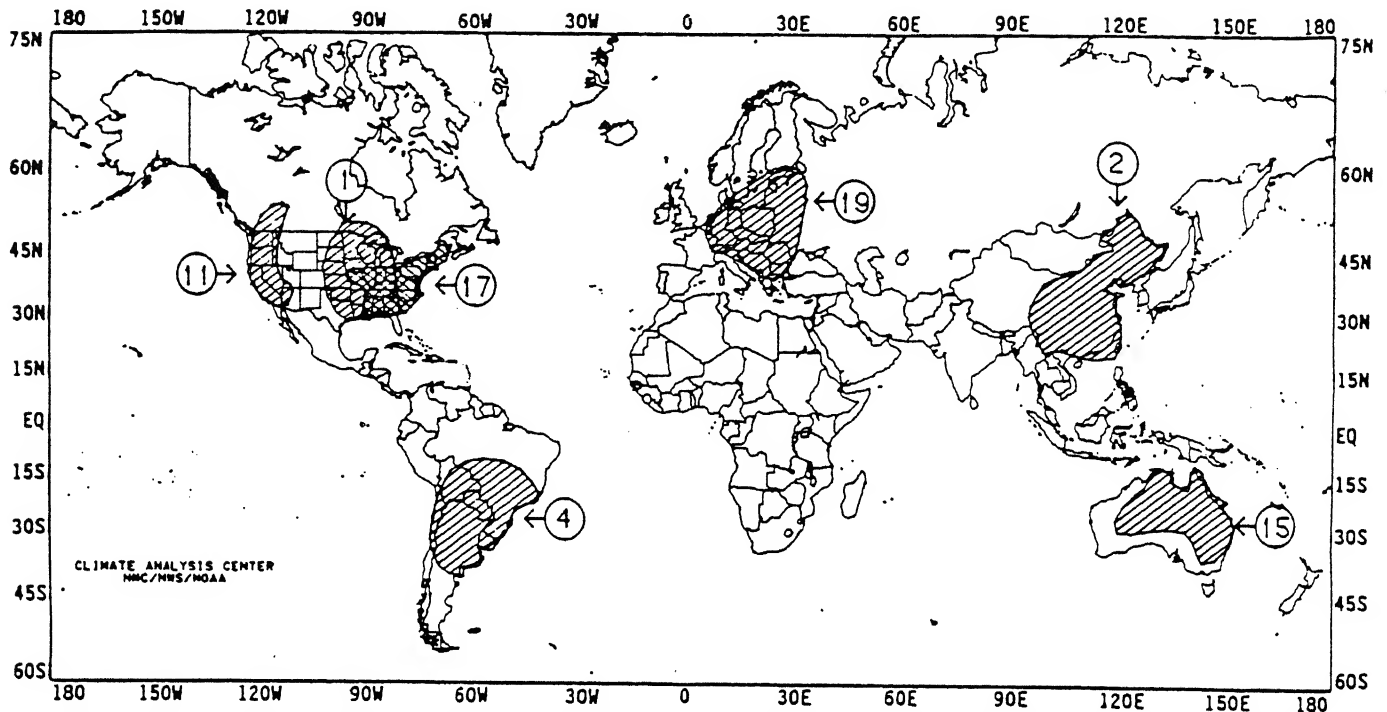
In early May, unusually dry conditions spread across West Germany, East Germany, Poland, Switzerland, and Austria. By the end of May the dryness covered much of central and southern Europe. In early June rains brought relief to central and southern Europe and by the middle of the month moderate rainfall ended the dry spell [see Figure 1].

20. Africa:

NEAR TO ABOVE NORMAL RAINY SEASON ACROSS SAHEL.

Heavy rainfall occurred across much of the Sahel region from Senegal eastward to Ethiopia during the rainy season (June through September). Flooding was reported in Nigeria and in the Sudan. Drainage from the torrential rains in the central Ethiopian highlands exacerbated the situation downstream in central and northern Sudan. Subnormal seasonal precipitation totals were limited to southeastern Mauritania, central Mali, southeastern Burkina Faso, and the northern parts of Togo and Benin [see Figure 2].

SIGNIFICANT BELOW NORMAL PRECIPITATION ANOMALIES DURING 1988



SIGNIFICANT ABOVE NORMAL PRECIPITATION ANOMALIES DURING 1988

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SIGNIFICANT BELOW NORMAL PRECIPITATION ANOMALIES DURING 1988

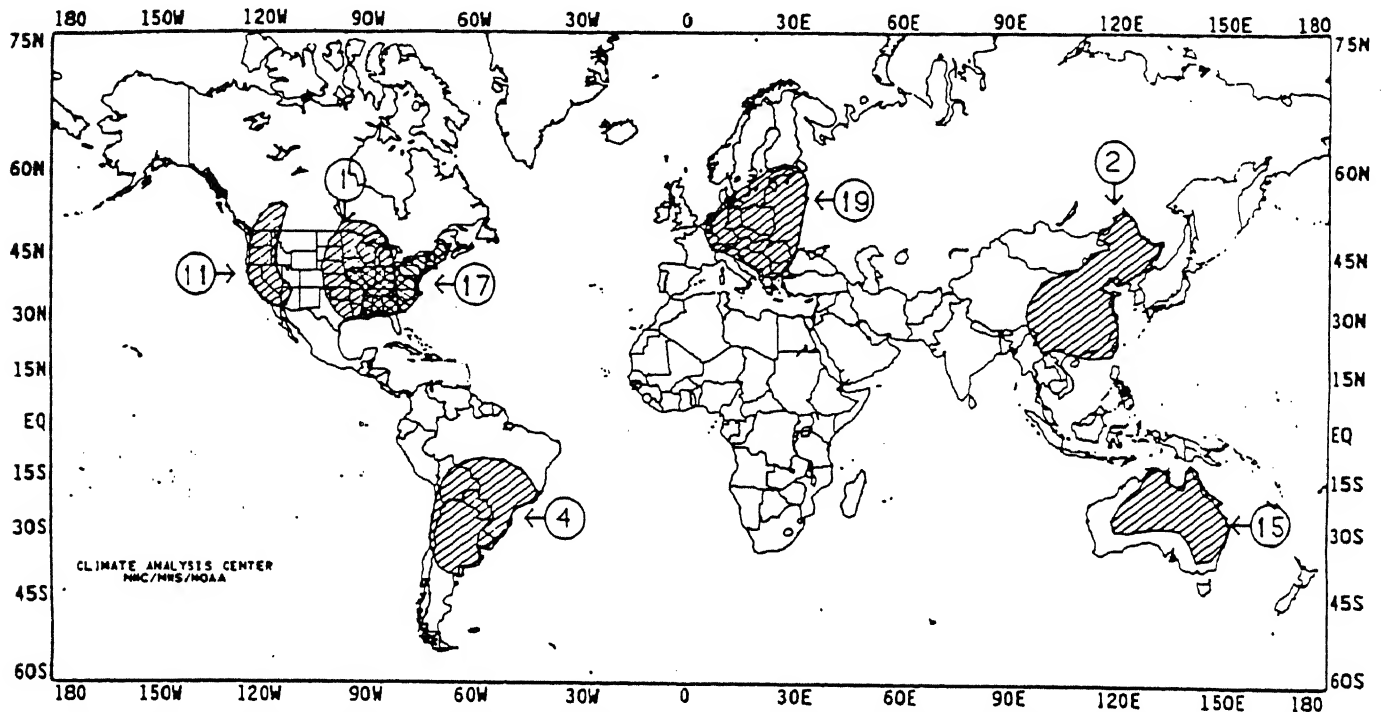


Figure 1. Significant below normal precipitation (dry) anomalies during 1988.

SIGNIFICANT ABOVE NORMAL PRECIPITATION ANOMALIES DURING 1988

SIGNIFICANT ABOVE NORMAL TEMPERATURE ANOMALIES DURING 1988

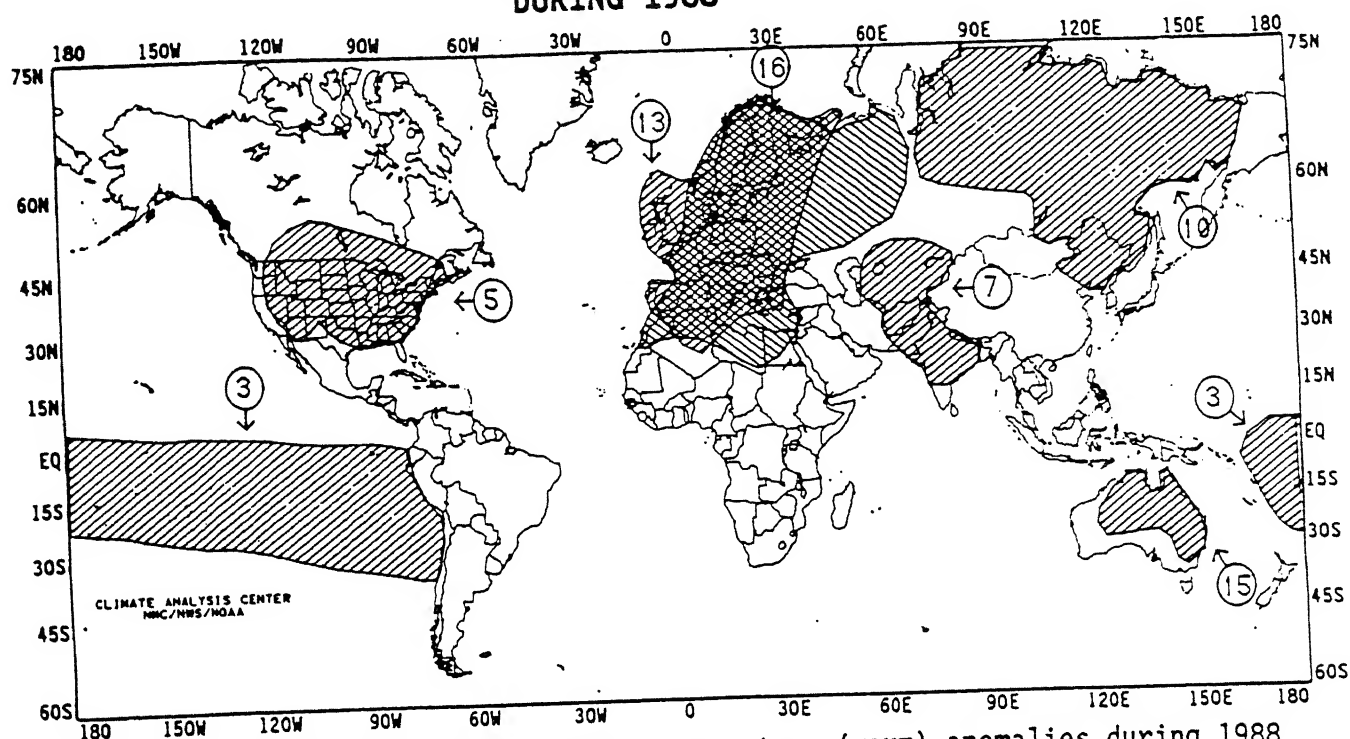


Figure 3. Significant above normal temperature (warm) anomalies during 1988.

SIGNIFICANT BELOW NORMAL TEMPERATURE ANOMALIES DURING 1988

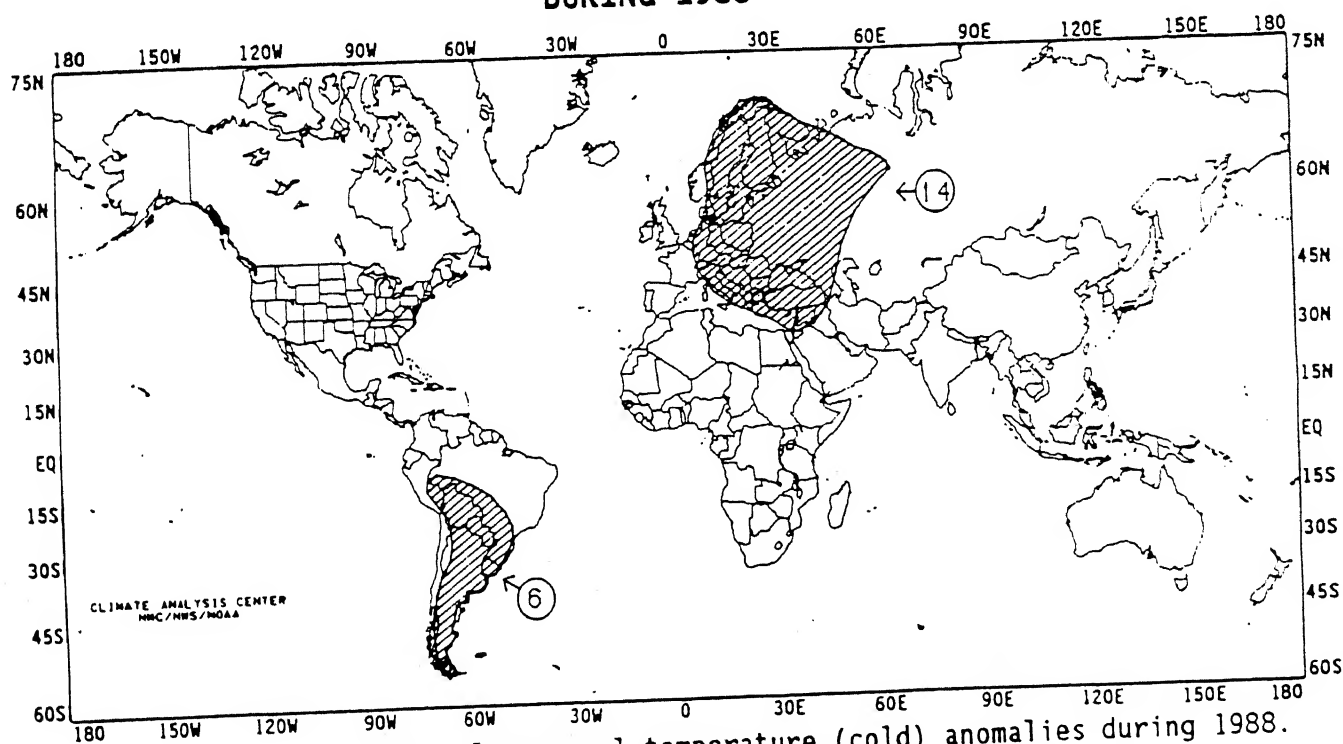


Figure 4. Significant below normal temperature (cold) anomalies during 1988.

WORLD CLIMATE BULLETIN 1988 INDEX

VOLUMES 88/01 TO 88/53

INDEX TO THE WEEKLY CLIMATE BULLETIN - 1988

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS

Annual Summary:

Global: 3
 United States: 3
 Apparent Temperatures: 20
 Average Date:
 Highest Normal Daily Maximum: 26
 Climate Anomaly Depletion:
 Explanation: 23,42
 Cold Anomalies:

Africa:
 Northern: 52
 Western: 52
 Bolivia: 30,31,32,33,34
 Brazil: 31
 Canada: 7,8
 Southeastern: 51,52

Europe:
 Eastern: 45,46,47,48,49,50,51,52
 Southeastern: 52

Greece: 53
 Paraguay: 30,32
 South America: 23,24,25,26,29
 Turkey: 27,28
 United States: 7,8
 Central: 2,3,4
 Eastern: 5,6,7,8,9,10,11,12,13,14,15,16,17

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS (CONTINUED)

Dry Anomalies (Continued):

Europe: 20,21
 Eastern: 22,23,24
 Southern: 40,41,42

India:

Central: 24,25,26
 Western: 27,28,29

Kenya: 1,2,17,18

Malagasy Republic: 1,2

Mozambique: 6

Paraguay: 6,7,8,9,40,41,42,43*,44,51,52

South Africa: 6,7*,8,9

South Korea:

Southern: 28

Tanzania: 1,2

Taiwan: 51,52,53

United States:

Central: 3

Eastern: 3

Southeastern: 12,13*,14,15,16,17

Western: 9,10,11,12,13,14,15,16*,17

Uruguay: 43*,44

Updates: 2,7,11,15

ENSO (El Nino/Southern Oscillation): 1,3,4,5,6,8,9,10,12,13,14,16,17,18,19,46*

Heavy Rain:

Bangladesh: 22,36

Brazil: 6

China: 22*,30

Colombia: 40

France: 30

India:

Northeastern: 22

Japan: 23,30,38

Rwanda: 20

South Korea:

Northern: 28

Sudan: 32

Thailand: 39,40,49

Turkey: 25

United Kingdom: 42

United States:

Arizona: 42

Louisiana: 14

New Mexico: 42

Northeastern: 21

Southeastern: 37

Washington: 42

Venezuela: 31

Numbers refer to week of publication in Bulletin.
 * Indicates a Special Climate Summary was published.

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS (CONTINUED)

Heavy Snow:
Middle East: 53
South Africa: 29
Monsoon:
India: 17*, 30*, 34*, 40*
Monthly Summary:
Global: 1, 7, 11, 16, 20, 25, 29, 34, 38, 42, 47, 51
United States: 1, 6, 10, 15, 19, 23, 28, 32, 36, 41, 45, 49
Palmer Drought Index: 13, 29, 44
Rainy Season:
Africa:
Sahel: 30*, 40*
Seasonal Summary:
United States: 11, 26, 37, 50
Severe Thunderstorms:
United States:
South Central: 47
Tornadoes:
United States:
North Carolina: 49
South Central: 47
Virginia: 49
Tropical Storms:
Bangladesh: 43, 49
Central America: 43, 44
Colombia: 43
Dominican Republic: 35
Gulf of Mexico: 38
India:
Eastern: 49
Malagasy Republic: 3
Mexico: 36
Philippines: 23, 43, 44, 46
Puerto Rico: 35
Taiwan: 23
United States: 39
Eastern: 35
Southeastern: 37
Venezuela: 43
Warm Anomalies:
Afghanistan: 22, 23
Africa:
Northern: 28, 29, 32, 33
Alaska:
Eastern: 52, 53
Algeria: 5, 6, 7, 8
Argentina: 13, 14
Asia:
Eastern: 4*, 5

Numbers refer to week of publication in Bulletin.
* Indicates a Special Climate Summary was published.

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS (CONTINUED)

Harm Anomalies (Continued):
Australia: 5, 6, 7, 10, 11
Tasmania: 18, 19, 20
Victoria: 18, 19, 20
Brazil: 13, 14, 15, 16, 17, 18, 19
Canada:
Eastern: 32, 33, 34
Northwestern: 52, 53
South Central: 23, 24, 25, 26, 27, 28, 29, 31*
China: 31
East Central: 29, 30
Northeast: 44, 45, 46
Europe: 28, 29, 31, 44
Central: 1, 2, 3, 4*, 5, 6, 7, 8
Northern: 30
Southern: 32, 33, 34
France:
Southwestern: 46
India: 37, 38, 39
Northern: 22, 23
Central: 24
Mozambique: 6
North Korea: 44
Pakistan:
Central: 22, 23
Portugal: 45, 46, 47, 48
South Africa: 6, 7, 32, 33
South Korea: 44
Spain: 45, 46, 47, 48
Tunisia: 5, 6, 7, 8
Union of Soviet Socialist Republics:
European: 24
Kazakh: 25, 26, 27, 28, 29, 30
Siberia: 44, 45, 46, 47, 48, 49, 50, 51, 52, 53
United Kingdom: 1
United States:
North Central: 23, 24, 25, 26, 27, 28, 29, 30, 31*, 33*, 34, 35*
Southwestern: 44, 45, 46, 47
Western: 36, 37, 38
Uruguay: 13, 14
Wet Anomalies:
Africa:
Sahel: 35*, 40*
Australia:
Northeastern: 50, 51, 52, 53
Northwestern: 52
Southeastern: 21, 22, 50, 51, 52, 53
Southwestern: 50, 51, 52, 53
Bangladesh: 28, 29
Botswana: 8*, 9*, 10, 11, 12, 13, 14, 15

Numbers refer to week of publication in Bulletin.
* Indicates a Special Climate Summary was published.

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS (CONTINUED)

Net Anomalies (Continued):

Brazil: 8*, 9, 10, 11, 12, 13
 China: 31, 32, 33, 34, 39, 40, 41
 Central: 36, 37, 38
 Southeastern: 22, 23
 Southern: 35
 Europe: 9, 10, 11, 12, 13, 14, 15, 16, 17
 Central: 52, 53
 Hawaii: 1, 2
 India: Northeastern: 28, 29
 Ireland: 31, 32
 Japan: Southern: 40, 41, 42
 Western: 40, 41, 42
 Kenya: 19, 20
 Malagasy Republic: 4, 5
 Scotland: 33, 34, 35, 36, 37, 38, 39
 South Africa: Northern: 9*, 10, 11, 12, 13, 14, 15
 Spain: Northeastern: 46
 Taiwan: 39, 40, 41, 42, 43
 Tanzania: 3, 4, 5
 Thailand: 21, 22
 Turkey: 27
 United Kingdom: 31, 32
 United States: Central: 1, 2, 48, 49, 50
 Zimbabwe: 8*, 9*, 10, 11, 12, 13, 14, 15
 Wind Chill: 41

Numbers refer to week of publication in Bulletin.
 * Indicates a Special Climate Summary was published.

INDEX TO THE WEEKLY CLIMATE BULLETIN - 1988

SPECIAL CLIMATE SUMMARIES (NOT MONTHLY OR SEASONAL) PUBLISHED IN 1988

4. Winter Temperatures Have Averaged Above Normal Throughout Europe and Eastern Asia.
7. Update on Seasonal Rains in Southern Africa.
8. Rio de Janeiro Area Afflicted by Severe Floods and Mudslides.
8. Unusually Wet Weather Covers Central South Africa, Southern Botswana, and Western Zimbabwe.
9. For the Second Consecutive Week Torrential Rains Hit Parts of South Africa, Botswana, and Zimbabwe.
13. Unusually Dry Weather Has Afflicted Much of the Southeast During the Last Nine Weeks.
14. Review of the 1987-1988 Australian "Rainy" Season.
16. Large Precipitation Deficiencies Exist at Most Locations in the West as the Rainy Season Normally Draws to an End in the Early Spring.
16. Recent Precipitation Has Brought Relief to Some Areas of the Southeast; However, Other Portions Have Remained Abnormally Dry.
17. The Indian Monsoon Season of 1987.
18. Abnormally Dry Conditions Have Persisted in the Northern Great Plains, Upper Midwest, and Southern Canada for the Last Seven Weeks.
20. Abnormally Dry Conditions Currently Exist in the Western, Southeastern, North Central, and Southern United States, and South Central Canada.
21. Much of the Central U.S., Especially the Midwest and Lower Mississippi Valley, Has Become Abnormally Dry over the Past Seven Weeks.
22. Parts of China Have Experienced Excessive Rainfall and Damaging Hailstorms During May.
24. How Long Has It Been Dry?
25. Update on the Abnormally Dry and Warm Conditions Across the Northern Great Plains, Midwest, and Southeast Since April 1.
27. Historical Comparisons of this June and April-June Precipitation and Temperature Rankings Since 1930 (Including "Dust Bowl" Years) and Since 1951 ("Recent" History).

Numbers refer to week of publication in Bulletin.

SPECIAL CLIMATE SUMMARIES (NOT MONTHLY OR SEASONAL) PUBLISHED IN 1988 (CONTINUED)

28. Brief Update on the Abnormally Dry Conditions Across the Central U.S.
30. Update on the Abnormal Dryness Across the Eastern Half of the U.S.
30. Review of the 1988 Indian Monsoon Season.
31. Regional Updates of the 1988 Drought: Precipitation Percentages and Deficits in the Northern Great Plains/Southern Canada, the Southeast, and the Mississippi Valley.
31. Cold Wave Hits Brazilian Coffee Region.
33. Abnormal Dryness Continues in Portions of the Northern Great Plains and the Mississippi and Ohio Valleys, But the Areal Coverage of Regions with Less than 50% of the Normal Precipitation Since April 1 Has Diminished Over the Past Six Weeks; However, Unusual Warmth Has Afflicted Much of the Northern and Eastern U.S.
34. Update of the 1988 Indian Monsoon Season.
34. Update on the African Sahel Rainy Season.
35. Hottest and Driest Years for the U.S. Climate Divisions During May-July Since 1931 (58 Years).
39. Historical Perspective on the April-June 1988 United States Climate Division's Precipitation and Temperature Data During the Last 58 Years.
39. Most of the Contiguous United States Has Measured Below Normal Precipitation During the Past Year (September 1987-August 1988).
40. Review of the 1988 Indian Monsoon Season.
40. Review of the 1988 African Sahel Rainy Season.
43. Northern Argentina, Paraguay, Uruguay, Southern Brazil, and Southeastern Bolivia: Dry Conditions Have Persisted Into the Normally Rainy Spring Season.
44. Long-Term Precipitation Deficiencies Since April 1 Still Remain in Much of the Mississippi and Missouri Valleys Despite Above Normal August and September Rainfall.
46. The High Index Phase (Opposite of El Nino, or Low Index Phase) of the Southern Oscillation in the Tropical Pacific May Affect Climatic Conditions Worldwide.
53. Extremely Dry Conditions Have Afflicted Much of Eastern China.

Numbers refer to week of publication in Bulletin.

